

REMARKS

The Office Action of December 29, 2006 has been received and its contents carefully considered. An RCE is being filed concurrently to permit further prosecution.

The present Amendment revises independent claims 21 and 30 to correct the informalities noted at the top of page 2 of the Office Action. Accordingly, the claim objection should be withdrawn.

The present Amendment also revises independent claim 21 to provide that at least one of the bumps is made of gold and has "a thickness of 10 μm to 30 μm ." This is supported (for example) by paragraph [0052] of the disclosure. Claim 21 has also been revised to recite that an Au-Sn alloy layer has "a thickness of 0.8 μm to 5 μm ." This is supported (for example) by paragraph [0026]. Using gold bumps that are 10 to 30 μm thick, in a self-alignment process that results in an Au-Sn alloy layer that is 0.8 to 5 μm thick, produces strong joints that can still be separated relatively easily if this becomes necessary.

Finally, the present Amendment revises independent claim 30, so that it is now directed to a method for making a semiconductor device in accordance with Figures 1A-2B of the application's drawings, with Au bumps and Au-Sn alloy layers having substantially the thicknesses that are now recited in claim 21.

The Office Action rejects independent claim 21 for obviousness based on five references. It is respectfully submitted that the sheer number of references combined in the rejection of claim 21 raises a presumption of hindsight reconstruction.

One of the references employed in the rejection is US patent 5,346,857 to Scharr et al (hereafter simply "Scharr"). The Office Action comments that Scharr teaches a tin layer having a thickness between 0.1 to 4 μm (a limitation that no longer appears in claim 21) and that at least one bump is made of gold. However, it is respectfully submitted that Scharr would not have provided an incentive, for an ordinarily skilled person, to modify the teachings of the remaining references so as to achieve the invention that is now recited in claim 21. In particular, Scharr would not have provided an incentive to use a tin layer on a gold bump that is 10 μm to 30 μm thick, and to join a chip or substrate to another chip by self-alignment using an Au-Sn layer that is 0.8 μm to 5 μm thick.

The Office Action rejects independent claim 30 on the basis of the same four references as claim 21, plus a fifth reference with bumps having ends that are substantially flat. Again, it is respectfully submitted that the sheer number of references suggests hindsight reconstruction.

Claim 30 now recites gold bumps that are about 10 μm to about 30 μm thick, and self-alignment via Au-Sn alloy layers that are about 0.8 to about 5 μm thick. This is not suggested by the references. In particular, it is respectfully submitted that the Scharr reference would not have led an ordinarily skilled person to modify the teachings of the remaining references so as to achieve the invention that is now recited by claim 30.

Since the remaining claims depend from the independent claims discussed above and recite additional limitations to further define the invention, they are patentable along with their independent claims and need not be further discussed.

For the foregoing reasons, it is respectfully submitted that this application is now in condition for allowance. Reconsideration of the application is therefore respectfully requested.

Respectfully submitted,



Allen Wood
Registration No. 28,134
Rabin & Berdo, P.C.
Customer No. 23995
(202) 326-0222 (telephone)
(202) 408-0924 (facsimile)

AW/ng